Technical Service Bulletin

Technical Service Bulletin: TSB200142	**Released Date**: 19-Jun-2020
C150D2Re, C200D2Re, C275D2Re Circuit Breaker Testing Procedure	

C150D2Re, C200D2Re, C275D2Re Circuit Breaker Testing Procedure

Warranty Statement

The information in this document has no effect on present warranty coverage or repair practices, nor does it authorize TRP or Campaign actions.

Contents

Product Affected

- C150D2Re
- C200D2Re
- C275D2Re

Issue

Issue: Field replacement of circuit breakers, that are found to be working when sent to factory, with below symptoms because of lack of troubleshooting procedure.

Symptom:

- Generator sets C150D2Re, C200D2Re, and C275D2Re while in operation appear to have malfunctioning circuit breakers. These circuit breakers appear to fail to open (Fault code 1453) and/or fail to close (Fault code 1452).

Root Cause:

- Failure of subcomponents associated with the circuit breaker and/or excessive dust ingress.

Verification/Confirmation

Affected population includes Mobile Rental Unit models C150D2Re, C200D2Re, and C275D2Re. If the circuit breaker (CB) on any of these models appear to fail to open or close, follow the service instructions below before returning the breaker to Cummins.

Table 1, Circuit Breaker Model and Part number

Table 1. Circuit Breaker Model and Part number

Generator Set Model	Type of circuit breaker	Amperage	Cummins Part Number	Manufacturer	Manufacturer Part Number

Generator Set Model	Type of circuit breaker	Amperage	Cummins Part Number	Manufacturer	Manufacturer Part Number
C150D2Re	PowerPact P frame, 3P-Auto	600A	A051C957	Schneider Electric	PGL36060U33AABUKMOYB
C200D2Re	PowerPact P frame, 3P-Auto	800A	A051C959	Schneider Electric	PGL36080U33AABUKMOYB
C275D2Re	PowerPact P frame, 3P-Auto	1200A	A051C966	Schneider Electric	PGL36120U33AABUKMOYB

Resolution

Follow the troubleshooting steps for circuit breaker in Service Instructions section of this TSB. After performing the tests, check for the CB operation, if it still fails to open/close then replace with a new one.

Service Instructions

Note : Only qualified and authorized technicians may perform this troubleshooting procedure as needed.

Ensure proper safety measures are taken with the right Personal Protective Equipment (PPE-gloves, safety goggle, etc.) and do not put hand/finger(s) inside CB during test. Also, while working on live power make sure to follow all electrical safety procedure according to NFPA 70E.

Generator Set Circuit Breaker Troubleshooting Procedure

Clean the Circuit breaker:

Ensure the generator set is in STOP condition and is de-energized electrically and mechanically. Before performing any test, clean the CB to ensure no dust will affect the mechanical parts from closing.

Remove any buildup of dust, dirt, grease or moisture from circuit breaker surfaces and do the same with the top-cover of the CB removed. The CB can be cleaned with a lint-free dry cloth or vacuum cleaner. Do not use compressed air. Use caution when using detergent-based cleaners or solvents as these may deteriorate faceplate, labels, and insulation materials. If required, clean contact surfaces of circuit breaker terminals and terminal pads or bus bars with a nonabrasive cleaner. Abrasive cleaners will remove plating, resulting in joint deterioration.

Figure 1, Circuit breaker with top-cover(gray) removed

Equipment needed: Multimeter

Resources:

C150D2Re/C200D2Re service manual literature number: A047Z290

C275D2Re service manual literature number: A048A404

- Appendix B.4 Wiring Diagram A060K411
  - Sheet 3 of 17: Genset connections (refer for Idle/Run switch wiring)
  - Sheet 5 of 17: Genset connections (refer for door switch and R6 wiring)
  - Sheet 6 of 17: Circuit breaker connections

Note : Before beginning this procedure, ensure that Circuit Breaker connections, PCC TB5, PCC TB10 connections are wired as per wiring diagram A060K411 in Appendix B.4 (sheet 6 of 17) of service manual. Trace each wire for confirmation.

Brief explanation about the CB Open and CB Close signals:

Circuit Breaker Open Signal is received when the CB open coil A4 receives switch B+ signal and this happens if:

1. The Customer Load AC Distribution door is open OR
2. The generator set Idle/Run switch is in IDLE position OR
3. The CB Open button is pressed on the HMI operator panel OR
4. One or more of the associated relays and wiring connection is faulty thus providing switch B+ at A4

Circuit Breaker Close Signal is received when the CB close coil A2 receives switch B+ and this happens if:

1. The CB Close button is pressed on the HMI operator panel OR
2. One or more of the associated relays and wiring connection is faulty thus providing switch B+ at A2

If there is an active CB Open signal, then it will override CB Close signal.

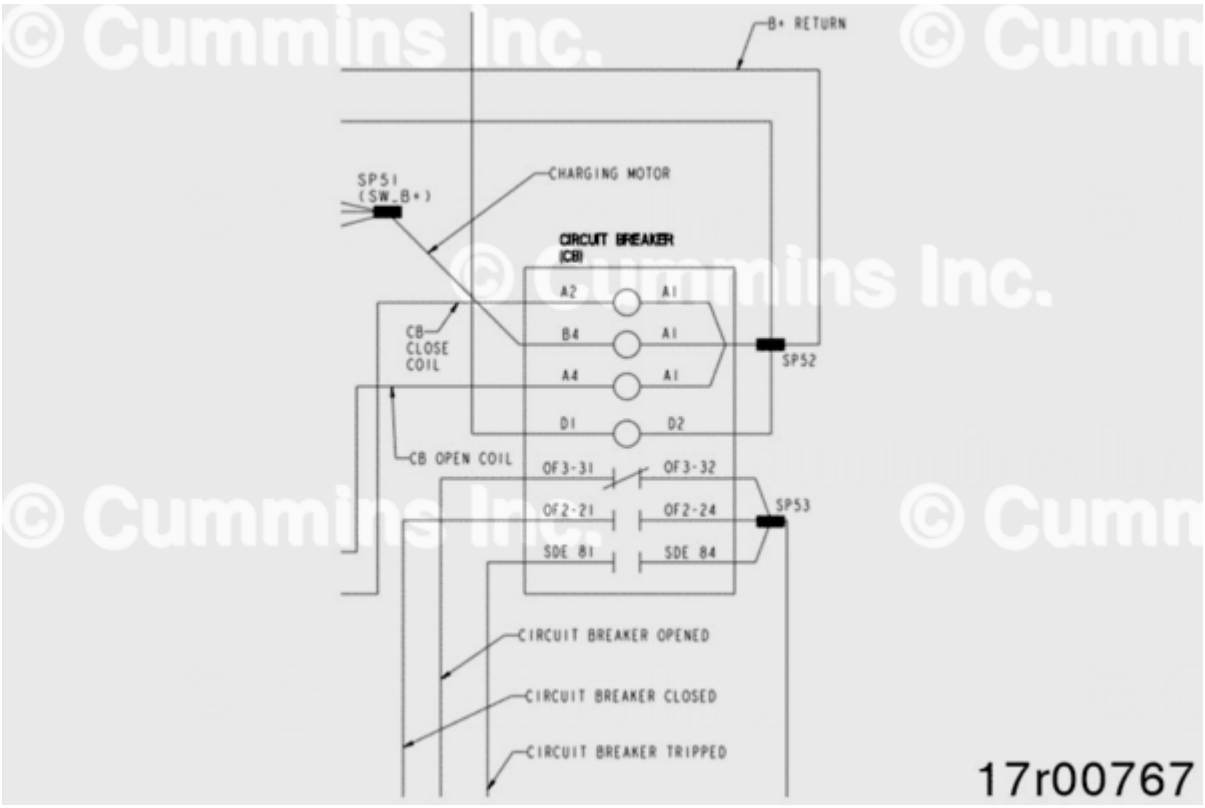

Figure 2, A section of the wiring diagram A060K411, sheet 6 of 17, circuit breaker connections

For the purpose of troubleshooting, it is recommended to run the generator set in manual mode.

Troubleshooting steps:

1. Ensure both control and power paralleling cables are disconnected from the generator set.
2. Ensure the Customer Load AC Distribution door is closed.
3. Before attempting to close CB, make sure the generator set is in RUN mode and not in IDLE mode. Start generator set and try to close and open the CB. If CB opens and closes as desired, then there is no issue.
4. If CB fails to close on FC1452, the CB might be getting an open signal at A4 or is not getting the close signal at A2. Perform the following checks:
    a. Test Distribution door switch at J43. Switch should be closed when door is closed. Replace switch if found bad and retry for CB closing operation.
    b. Test the R6 door switch relay. R6-30 is at 0VDC when door switch is closed. R6-30 is at switch B+ voltage when door switch is open. Replace R6 relay if found bad and retry for CB closing operation.

c. Test relay K23. Check for voltage at K23-A1 black connector located behind the panel. K23-A1 and K23-14 is at switch B+ and the indicator light on the relay is ON when door switch is open. Check the operation of K23 relay and it's NO contact. Replace K23 if found bad and retry for CB closing operation. Check wiring from K23-14 to J71/P71 5-6 and to K17-14.
d. Test Idle/Run switch. When in Idle position, P64 (on the rear side of the Idle/Run switch) is at switch B+ voltage. When in Run position, P64 is at 0VDC. Replace switch if found bad and retry for CB closing operation.
e. Test K16 relay. To close the CB a positive 24 V (switch B+) signal should be applied at the breaker A2 interconnection point. This signal arrives from K16-14 when K16 is commanded by PCC (TB5-1 to K16-A2, signal is a B+ return). The closing command from PCC is pulse type. You will need to set your multimeter on MIN/MAX value to record the signal at the breaker A2 point when commanded from CB Close button on operator panel. Replace K16 if found bad and retry for CB closing operation.

5. If CB fails to open on FC1453, the CB might not be getting the open signal at A4. Perform the following checks:
   a. Test K17 relay. To Open the CB, a positive 24 V (switch B+) signal should be applied at the breaker A4 interconnection point. This signal arrives from K17-14 when K17 is commanded by PCC (TB5-5 to K17-A2, signal is a B+ return). The opening command from PCC is pulse type. You will need to set your multimeter on MIN/MAX value to record the signal at the breaker A4 point when commanded from CB Open button on operator panel. Replace K17 if found bad and retry for CB opening operation.
6. Remove top cover from circuit breaker and locate contacts OF3-1, OF3-2, OF2-1, OF2-4, SDE-1, and SDE-4.
7. Check auxiliary contact between SDE 1 and SDE 4, they should be open (when CB is in open state). Replace contacts if found bad.
8. Check auxiliary contact OF2 between OF2-1 and OF2-4, they should be open (when CB is in open state). Replace contacts if found bad.
9. Check auxiliary contact OF3 between OF3-1 and OF3-2, they should be closed (when CB is in open state). Replace contacts if found bad.
10. Check auxiliary contact OF2 between OF2-1 and OF2-4, they should be closed (when CB is in closed state). Replace contacts if found bad.
11. Check auxiliary contact OF3 between OF3-1 and OF3-2, they should be open (when CB is in closed state). Replace contacts if found bad.
12. Check for CB operation, if the CB still fails to open/close, turn off battery power, disconnect all connections to the CB and replace with a new CB.
13. If CB was replaced with a new one, please check the CB close/open operation after installation.

Figure 3, To access K23, open the bottom half of the panel using a 10 mm socket

Figure 4, K23 is behind the panel next to K19. There is an indicator light on K23.

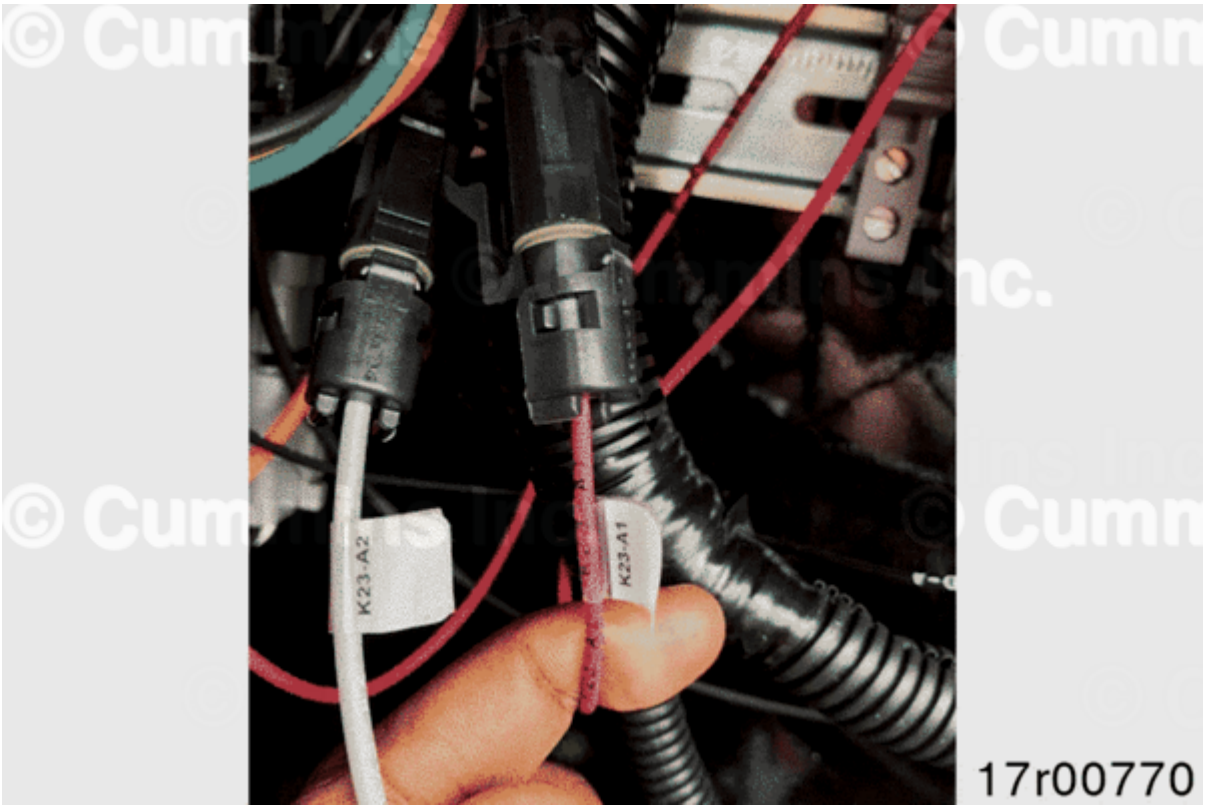

Figure 5, K23-A1 connector

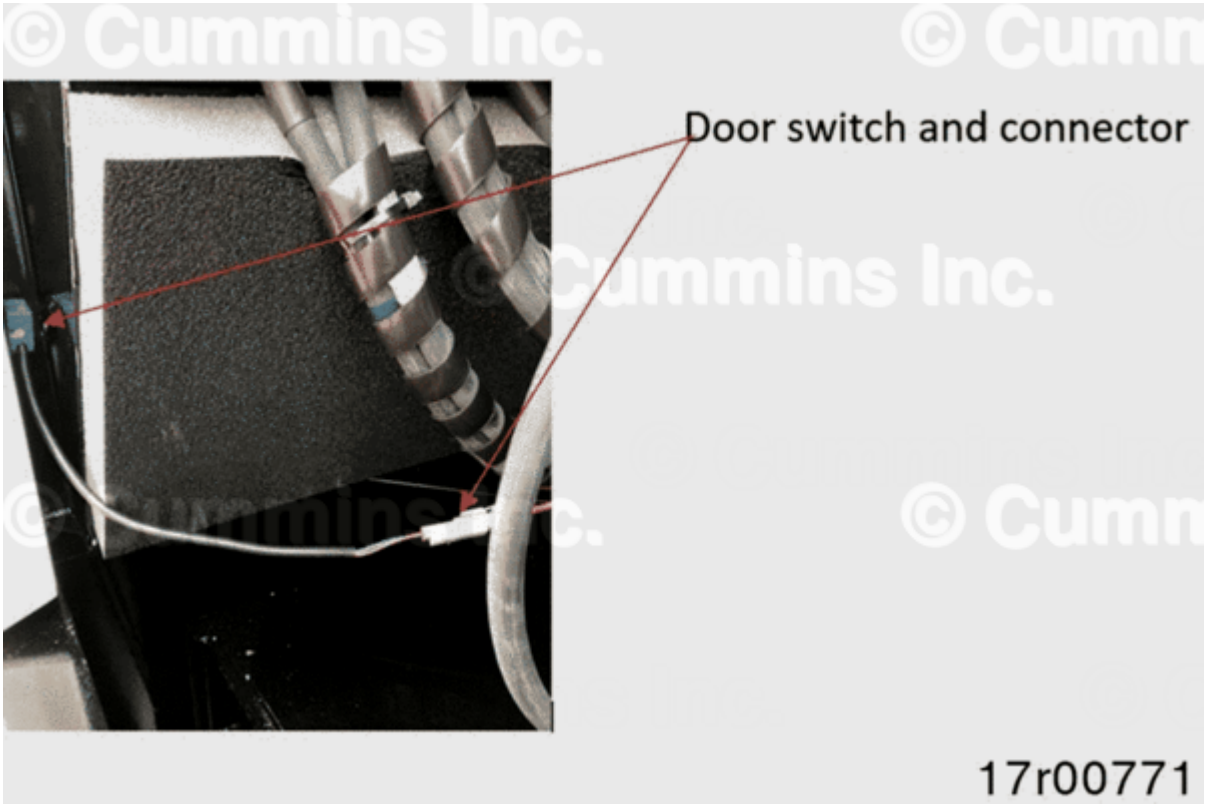

Figure 6, Door switch and connector

Figure 7, Open front panel by removing the two screws

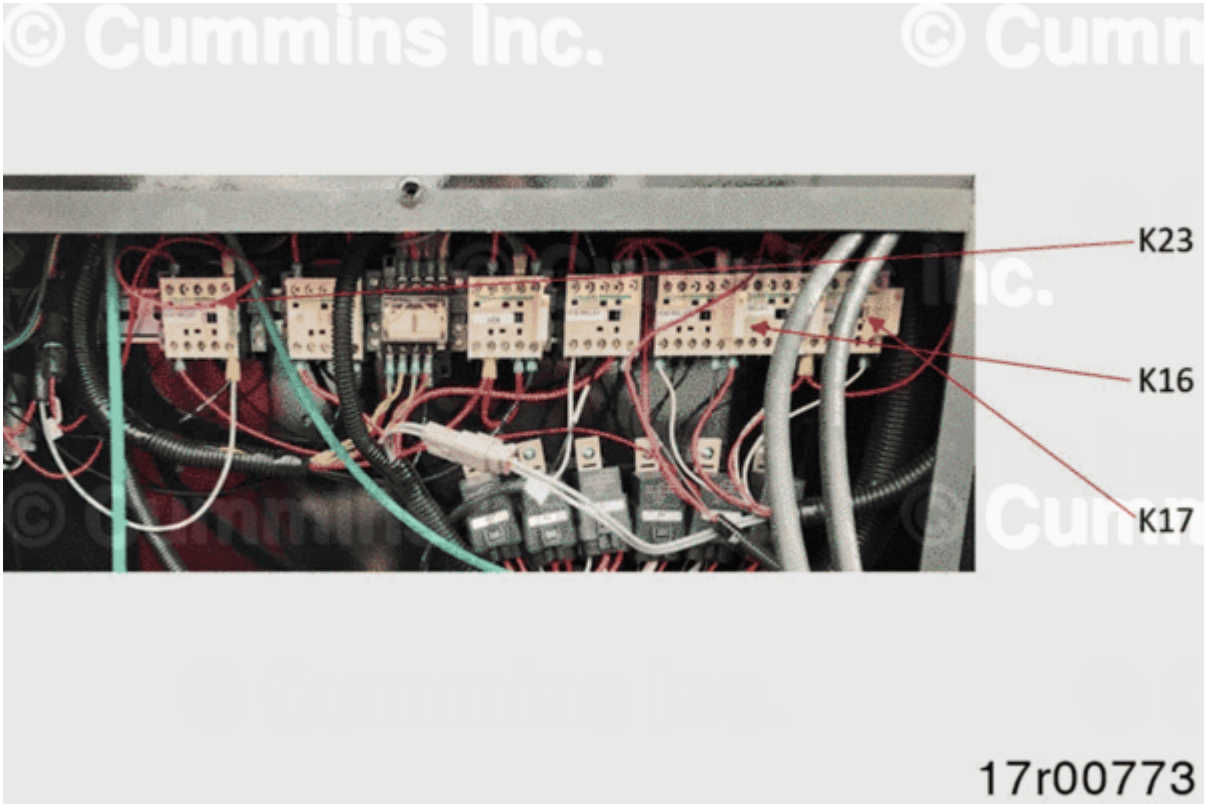

Figure 8, K23, K16, K17 Relay locations

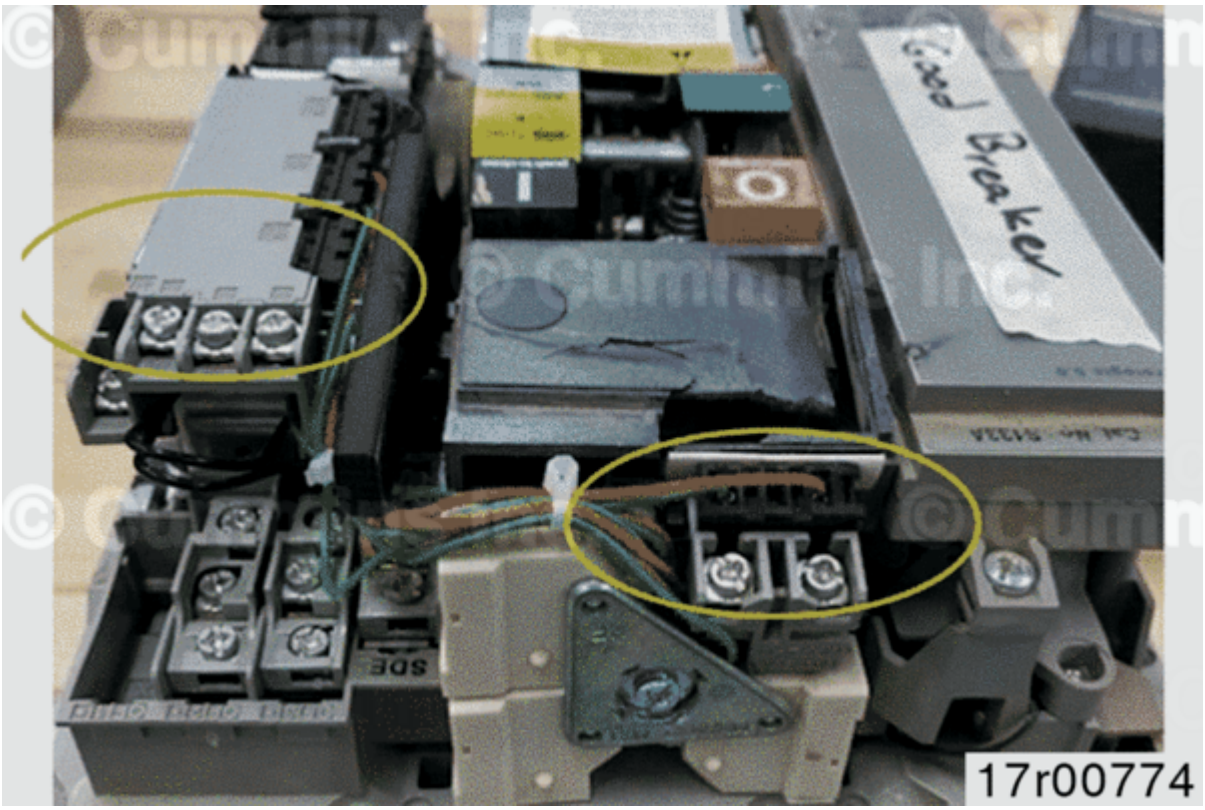

Figure 9, A1, A2, A4, B4, D1, D2 locations

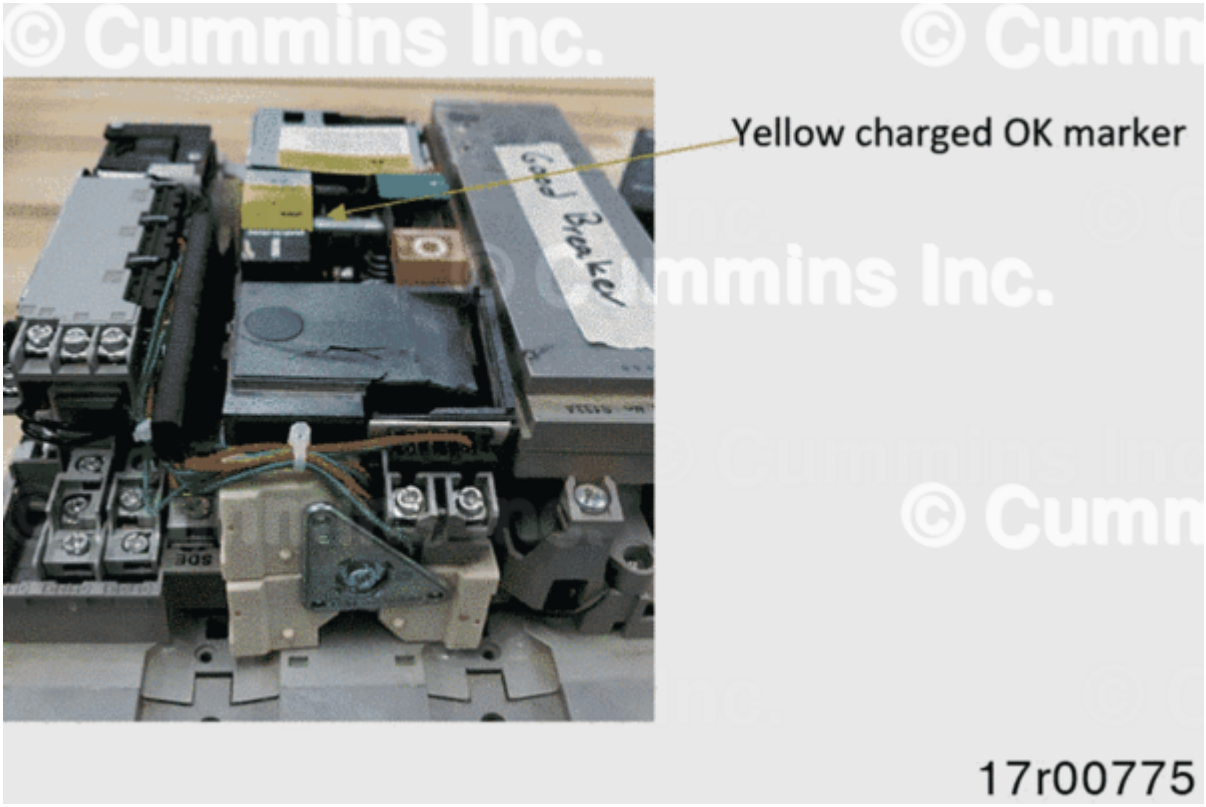

Figure 10, Marker location

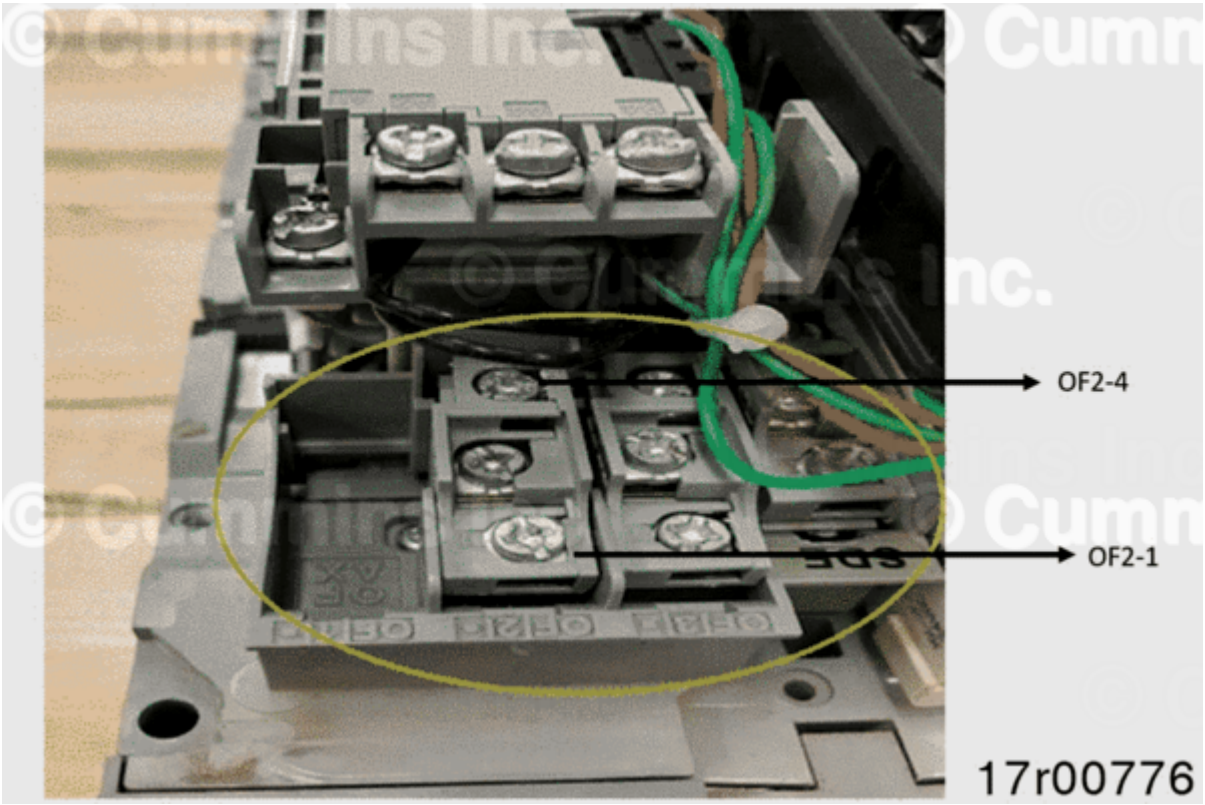

Figure 11, Auxiliary Contact locations

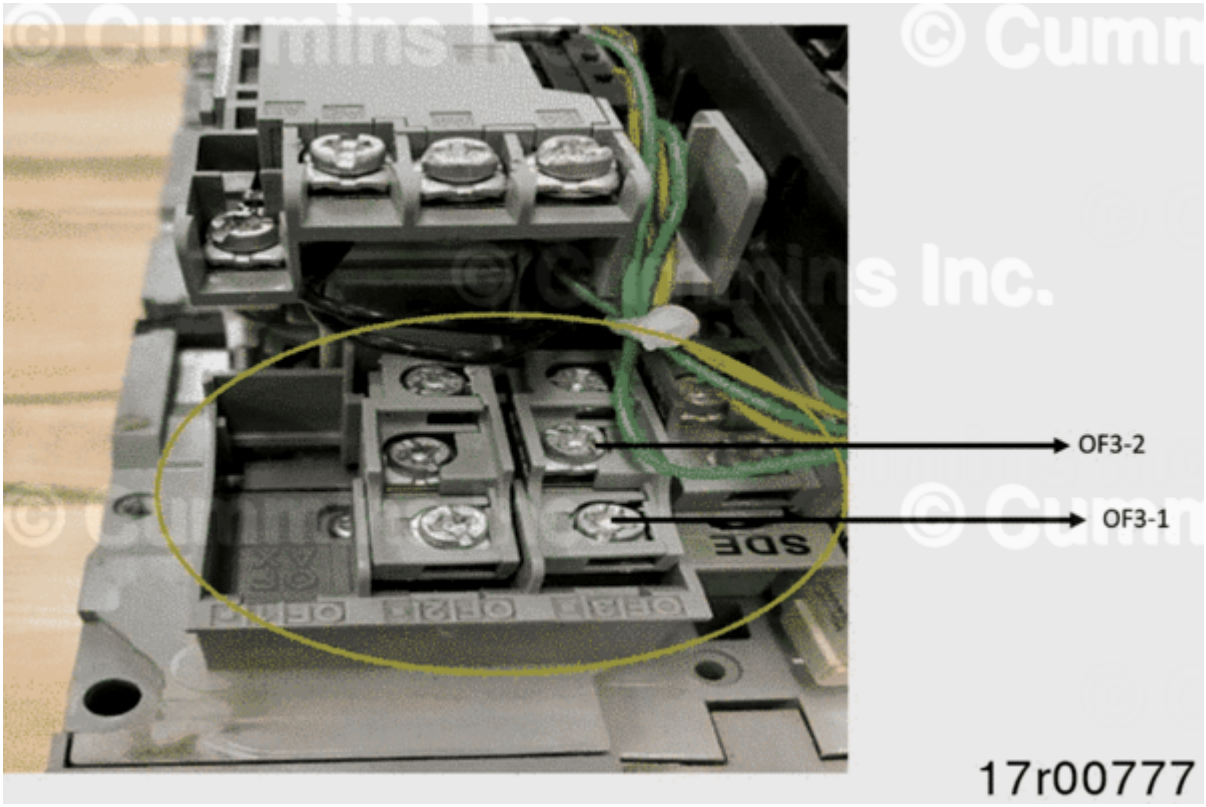

Figure 12, Auxiliary Contact locations

Service Parts Availability

Service parts are available. See Table 2 for part numbers.

Table 2, Service Parts	
Part Description	**Existing Part Number**
Door Switch	A052W981
R6 door switch relay	A055C353
Idle/Run Toggle Switch	A032Z092
K16/K17/K23 relay	0307-2874
Auxiliary contacts (OF/SDE)	0320-2196-01

Publications Affected/Associated Publications

Implemented for production. See Table 3.

Table 3, Publications Affected				
Manual Type	**QSOL Document Part Number**	**Procedure / Section Title**	**Procedure**	**Section**
Service Manual	A047Z290	Circuit Breaker	Circuit Breaker Testing - Auto	6.11
Service Manual	A048A404	Circuit Breaker	Circuit Breaker Testing - Auto	7.11

Document History

Date	Details
2020-6-19	Module Created

Last Modified: 19-Jun-2020